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General Notes.

PETROGRAPHY.[1]

The Basic Rocks of Devonshire.—The diabases of southern Devonshire, England, have been carefully investigated by Busz.[2] The diabases occur in floors often between Devonian slates and schists. The plagioclase of a specimen from Anstie's Cove, near Torquay, is partially changed to prehnite. All specimens contain brown hornblende, which is regarded as original. At Babbacombe the diabase is full of porphyritic crystals of labradorite. The groundmass in which these lie is composed of a second generation of plagioclase in a serpentine-like secondary matrix, which has been derived from the augite and other components of the original rock. Both porphyritic and groundmass plagioclases are deformed as the result of pressure. At Highweek blocks of a pale pikrite were found. Their material is identical in appearance with the rock of Nassau. It consists of olivine, augite, feldspar, biotite, enstatite, apatite and magnetite. The rock is very much altered. Its composition, as shown by analysis, is:

SiO_2	Al_2O_3	Fe_2O_3	FeO	CaO	MgO	Na_2O	K_2O	H_2O	TiO_2	P_2O_5	FeS_2	Total
40.12	7.76	7.35	8.66	6.53	23.69	1.20	.53	4.03	.37	.18	.20	=100.62

It contains also traces of Cl, CO_2 and Cu.

Along the banks of the Avon, at South Brent, blocks of Kersantite are met with. The rock possesses no noteworthy features, except that in it are crystals of orthoclase surrounded by zones of newly formed plagioclase.

The Magmatic Alteration of Hornblende and Biotite.—Hornblende and biotite in many igneous rocks are surrounded by zones of augite and magnetite that have resulted from their alteration. The process by which this zone or rim has been formed is generally looked

[1] Edited by Dr. W. S. Bayley, Colby University, Waterville, Me.

[2] Neues Jahrb. f. Min., etc., 1896, I, p. 57.

upon as a chemical one. The rock magma is supposed to have fused the hornblende or biotite grains, or to have partially dissolved them, and from the resulting mass the augite and magnetite are believed to have crystallized. Washington,[3] in a recent article, discusses this theory. He shows that the alteration is confined almost exclusively to the constituents of the intermediate and basic volcanic rocks. It is not a phenomenon of acid rocks, nor of plutonic basic ones. The author believes that the two minerals named are formed under intratellurial conditions, and that when the conditions are changed to those prevailing at the surface the complete but homogeneous compounds break up into a heterogeneaus aggregate of simpler ones, *i. e.*, becoming paramorphed. It is believed that many of the grains of augite and magnetite scattered through certain volcanic rocks may have been components of these paramorphs that have been carried from their original positions by magma movements. Some of the augite andesites are thought to owe their augitic constituent to the processes above outlined.

Petrography of the Little Rocky Mountains, Mon.—The Little Rocky Mountains are situated in central Montana, about 180 miles east of the Rocky Mountains proper. They are formed by a dome-shaped uplift of Paleozoic and older rocks in the midst of horizontal cretaceous strata. The nuclear rocks are classed by Weed and Pirsson[4] as Archean-Algonkian, because consisting of various schists associated with a quartzite. Around these and covering them, over much of the extent of the mountains, are porphyries that grade in places into phenolitic facies. The rock was extruded as a laccolitic mass, which now partially covers the Archean schists. In the main it is a granite porphyry, containing orthoclase and oligoclase phenocrysts in a fine grained groundmass composed almost exclusively of orthoclase, anorthoclase and quartz. This rock is replaced occasionally by a syenite-porphyry, or by a granite-diorite-porphyry, which differs from the granite-porphyry in the presence of chloritized augite and in the predominance of plagioclase phenocrysts over orthoclastic ones. At two places tinguaite replaces the normal rock. This phonolitic phase is a dense, dark-green rock, that is apparently a contact phase of the normal porphyry. In their section the tinguaite shows large phenocrysts of sanidine and smaller ones of augite in a fine groundmass of alkali-feldspars, aegirite and nephelite. The syenite-porphyry from Lookout Butte is characterized by the absence of all minerals but the feldspars and a little

[3] Jour. Geol., Vol. IV, 1896, p. 257.

[4] Jour. of Geology, Vol. IV, 1896, p. 399.

quartz, and by the fact that the feldspars of the groundmass are almost exclusively albites. An analysis of the predominant granite-porphyry yielded:

SiO_2	Al_2O_3	Te_2O_3	FeO	MgO	CaO	Na_2O	K_2O	TiO_2	BaO	S_2O	H_2O	Cl	Total
68.65	18.31	.56	.08	.12	1.00	4.86	4.74	.20	.13	.10	1.10	.03	=99.88

The Volcanic Rocks of Bolsena, Italy.—The volcanic rocks of the Bolsena region in Italy are reported by Washington[5] to comprise two distinct types—the trachytic and the leucitic. The former include andesite and vulsinite, a rock that differs from normal trachyte in containing a great deal of plagioclase and occasionally some olivine. The plagioclase is anorthite. Both this mineral and the large crystals of orthoclase that occur as phenocrysts are surrounded by mantles of orthoclase in optical continuity with the nuclear grains. An analysis of the rock gave:

$S:O_2$	TiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	P_2O_5	Ign	Total
58.21	tr	19.90	4.07	.87	.98	3.58	2.57	9.17		.74	=100.09

The vulsinite is thus an effusive rock intermediate in character between trachyte and andesite.

The leucite rocks are leucitites, leucite-phenolites (leucite-orthoclase), leucite-tephrite and leucite-basanites. All these rocks are briefly described by the author.

The Analcite-bearing Rocks.—Pirsson,[6] in a general article on the monchiquites and other related rocks gives the results of his study of a number of interesting rock types, all of which contain analcite. The glassy base of monchiquites is shown to have the properties of this mineral. Analcite is also thought to be present in many other rocks as an original component. The conditions favorable to its production are those that obtain in dikes or other small intrusive masses—they are dike forms of theralites on the one hand, and tephrites, nephelinites, etc., on the other. There exists, according to the author, an analcite group of rocks, just as there exists a leucite group. The monchiquites are analcite basalts and the fourchites are analcitites.

Petrographical Notes.—Callaway[7] gives a brief account of the origin of schists of the Malvern Hills, England. The rocks were originally diorites, epidiorites, granites and felsites. They have been changed to schists by the usually processes of dynamic metamorphism. The

[5] Jour. Geol., Vol. IV, 1896, p. 542.
[6] Jour. Geol., Vol. IV, 1896, p. 679.
[7] Proc. Liver. Geol. Society, 1895–96, p. 453.

banding of some of the schists is due to interlaminations of igneous rocks of different characters.

Several new occurrences of alnoite are described by Smyth[8] from near Manheim, N. Y. The rock of a small dyke does not differ in any essential respect from the rocks described a few years ago. The rock of a large dyke is very fine grained on the margin of the dyke, but in its interior it is a coarse grained panidiomorphic aggregate of reddish-brown mica and serpentine pseudomorphs after olivine, together with a little magnetite, apatite and perofskite. Melilite has not been observed in the rock, but the author thinks that it may have been present before alteration set in.

In the report on the the Mine la Motte sheet of the Missouri Geological Survey, Keyes and Haworth[9] describe the Archean rocks found within the district as granites which pass upwards into prophyries. Some of the granites are granular, while others are porphyrtic. In composition they are normal. The porphyries are like those of the Iron Mountain district. The acid rocks are cut by intrusions of diabase, and of quartz disabase porphyrites.

In a collection of rocks from the Provinces Kansu, Schensi, Hupe and Honan, in China, Steuer[10] finds granites, hornblende-vogesite, melaphyre, serpentine, amphibolite, gneiss, and various schists and sediments.

GEOLOGY AND PALEONTOLOGY.

Lambdotherium not Related to Palæosyops or the Titanotheres.—The little species *Lambdotherium popoagicum* of the Wind River beds, found contemporary with *Palæosyops borealis*, has been treated by Cope, Earle and others as an ancestral titanothere. A more careful examination of the numerous specimens in the American Museum shows at once that it bears much closer resemblances to the horses, especially in the chisel-shaped incisors, the atlas, the manus and pes.

A restatement of its definition and principal characters appears to be of value.

[8] Amer. Jour. Sci., 1896, Vol. II, p. 290.

[9] Missouri Geol. Survey, Sheet Report, No. 4. p. 24.

[10] Neues Jahrb. f. Min., etc., 1896, II, p. 477.